

*On the Heart of Dentalium.* By Dr. L. PLATE, Marburg.

In "Bemerkungen zur Organisation der Dentalien" (Zool. Anz. 1888), published rather more than two years ago \*, I adopted the view expressed by Lacaze-Duthiers in his classical treatise on the Scaphopods, that these peculiar Mollusks do not possess a heart, but that the blood is driven along in the lacunæ by the contractions of the musculature of the body-wall only. Subsequent investigations have shown me that this assertion does not correspond with facts, but that a heart, albeit a rudimentary one, is actually present, lying in a special pericardium. The possible existence of the latter has already been suggested by the above-mentioned French anatomist. It is well known that the largest of all the blood-spaces, the so-called *sinus abdominalis*, runs along the median line of the ventral side of the body. At the anterior end of this, a little behind the anal opening, there is a hemispherical projection of the body-wall into the pallial chamber. This protuberance, which is marked *p* by Lacaze-Duthiers in plate ii. fig. 2 of his paper ('Annales d. Sc. nat. Zoologie, sér. 4, t. vii. 1857'), is produced by the completely closed pericardial sac, the ventral wall of which unites intimately with the integument, while the dorsal wall is applied to the stomach and the two nephridial sacs. Since Lacaze-Duthiers naturally did not succeed in filling the pericardium with colouring-matter by injection from the abdominal sinus, he remarks with justice:—"It therefore seems to me reasonable to admit that this sac is closed, and that it perhaps represents a rudiment of a peritoneal, pericardial, or some sort of serous cavity." Now in this chamber there lies the heart, in the shape of a rounded thin-walled pouch, which is not further divided into auricle and ventricles. The degenerate condition of the heart is expressed in this simplicity of structure and in the entire absence of vessels provided with special walls and of reno-pericardial openings. The heart is nothing more than a sac-shaped invagination of a portion of the dorsal pericardial wall into the lumen of the pericardium. The blood-corpuscles find their way into it, since they pass from the abdominal sinus into narrow fissures which lie between the stomach and the dorsal wall of the pericardium, and which are due to the fact that the two latter are united together only in places. From these fissures they fall into the heart itself, when the invagination takes place. When the heart contracts they are driven into similar fissures which are situated between the dorsal wall of the pericardium and the nephridia, and so find their way into the perianal sinus. Into histological details I will not at present enter; I may only remark that the histological structure is the same in the pericardium as in the wall of the heart itself, and that there exist in both numerous muscular fibres lying parallel with one another and arranged in rings. Nevertheless the contractions appear only (or at

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least chiefly) to take place in the heart: on this point fresh observations on living animals, which I have not at the present moment at my disposal, are much to be desired.—*Zoologischer Anzeiger*, xiv. Jahrg., no. 357, Feb. 23, 1891, pp. 78–80.

*The Function of the Gemmiform Pedicellariæ of Sea-Urchins.*

By M. HENRI PROUHO.

Since the pedicellariæ of Sea-Urchins were described by O. F. Müller the nature and functions of these singular organs have been explained in very different ways. In a paper on certain Echinoids from our own coasts\* I asked myself what the rôle of the pedicellariæ was; and not being able at the moment to make a statement based upon definite observation, I had to content myself with the only probable hypothesis, and consider the pedicellariæ to be organs of defence. To-day I have the honour of submitting to the Academy an observation made in the aquarium of the Arago laboratory, which may easily be repeated.

The pedicellariæ of the Echinidæ were long ago divided into three classes, viz. the ophicephalic, the tridactyle, and the *gemmiform*. In the present notice we have to concern ourselves with the last of the three only, that is to say with those which exhibit jaws, each provided with a muscular and glandular pouch, the secretion of which issues at the tip, which is terminated by a sort of poison-claw. The head of the gemmiform pedicellariæ of *Strongylocentrotus lividus* is directly attached to a calcareous stalk articulated to the test; it is capable of movement on the extremity of this stalk, but it cannot bend down to its base, so that an animal of small size which could glide to the foot of the pedicellaria would be sheltered from its attacks. The gemmiform pedicellaria cannot stoop to seize its enemy, and is therefore at a disadvantage in protecting the test. Moreover these pedicellariæ, which in *Strongylocentrotus lividus* have a length of 1 centimetre, are scattered through a forest of spines, a very large number of which are as much as 3 to 4 centim. long. If, therefore, a large animal approach the Sea-Urchin to attack it, it would seem that this animal would be protected by the spines themselves against the bites of the pedicellariæ. In short the active zone of these organs, which lies above the test and below the tips of the spines, appears to us, *à priori*, badly placed, and the *ensemble* of the facts is well calculated to make us pause ere we consider the gemmiform pedicellariæ to be weapons of much effect, notwithstanding their glands and poison-claws. But the difficulty completely disappears when we observe the way in which the Sea-Urchin defends itself by the aid of its gemmiform pedicellariæ.

If in a tub containing one or several specimens of *Asterias glacialis*, previously kept without food for a considerable period, we place a *Strongylocentrotus lividus* †, we shall not have long to wait

\* 'Archives de Zoologie expérimentale,' 1887.

† The experiment here described I have repeated with *Sphærechinus granulatus*, with identically the same results.